



Material Safety Data Sheet

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SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Novec™ Contact Cleaner
MANUFACTURER: 3M
DIVISION: Electronics Markets Materials Division
ADDRESS: 3M Center, St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

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Product Use:

Intended Use: Contact Cleaner

SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
Methyl Nonafluoroisobutyl Ether	163702-08-7	50 - 70
Methyl Nonafluorobutyl Ether	163702-07-6	30 - 50
Carbon Dioxide	124-38-9	1 - 5

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Aerosol

Odor, Color, Grade: Clear, Colorless, Liquid with Slight Ethereal Odor, Contents Under Pressure

General Physical Form: Liquid

Immediate health, physical, and environmental hazards: Closed containers exposed to heat from fire may build pressure and explode. May cause target organ effects.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:

Contact with the eyes during product use is not expected to result in significant irritation.

Skin Contact:

Contact with the skin during product use is not expected to result in significant irritation.

Inhalation:

If thermal decomposition occurs:

May be harmful if inhaled.

Intentional concentration and inhalation may be harmful or fatal.

May be absorbed following inhalation and cause target organ effects.

Ingestion:

May be absorbed following ingestion and cause target organ effects.

Target Organ Effects:

Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

A 3M Product Environmental Data Sheet (PED) is available.

This substance has chemical moieties that are resistant to biodegradation and is likely to only undergo partial biodegradation in the environment. The high potential of this substance to move from water to the atmosphere means its potential to bioconcentrate is likely to disappear rapidly from aerobic environments. Take precautions to prevent direct release of this product to the environment. **AQUATIC TOXICITY:** Testing results indicate that this product has insignificant toxicity to aquatic organisms at its saturation point (Lowest LC50, EC50, or IC50 > substance water solubility). This substance is highly volatile and has a high Henry's Law constant and is thus expected to move rapidly through vaporization from solution in an aquatic compartment or from a soil surface in a terrestrial compartment to the atmosphere.

ATMOSPHERIC FATE: Zero Ozone Depletion Potential (ODP). Atmospheric Lifetime: approximately 4.1 yrs. Global Warming Potential (GWP): 280 (100 year ITH, IPCC1995 method). Global Warming Potential (GWP): 320 (100 yr ITH, IPCC2001 method). Atmospheric degradation products are expected to include: for methyl nonafluoroisobutyl ether: predominantly isoperfluorobutyric acid, CO₂, HF, and perhaps also CF₃COOH; for methyl nonafluorobutyl ether: n-perfluorobutyric acid, CO₂, and HF.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.

Skin Contact: Wash affected area with soap and water. If signs/symptoms develop, get medical attention.

Inhalation: If signs/symptoms develop, remove person to fresh air. If signs/symptoms persist, get medical attention.

If Swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature	405 °C [<i>Details:</i> per ASTM E659-84 method]
Flash Point	No flash point
Flammable Limits(LEL)	[<i>Details:</i> None per ASTM 681-94 method @100C]
Flammable Limits(UEL)	[<i>Details:</i> None per ASTM 681-94 method @100C]

5.2 EXTINGUISHING MEDIA

Non-combustible. Choose material suitable for surrounding fire.

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Exposure to extreme heat can give rise to thermal decomposition. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Closed containers exposed to heat from fire may build pressure and explode. No unusual effects are anticipated during fire extinguishing operations. Avoid breathing the products and substances that may result from the thermal decomposition of the product or the other substances in the fire zone. Keep containers cool with water spray when exposed to fire to avoid rupture.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

If possible, seal leaking container. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an impermeable surface until appropriate packaging for the leaking container or its contents is available.

Ventilate the area with fresh air.

6.2. Environmental precautions

Place depressurized can and clean up wastes in a closed container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

Clean-up methods

Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Contain spilled material. Clean up residue. Place depressurized can and clean up wastes in a closed container approved for transportation by appropriate authorities.

In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

For industrial or professional use only. Do not breathe thermal decomposition products. Avoid breathing of vapors, mists or spray. No smoking: Smoking while using this product can result in contamination of the tobacco and/or smoke and lead to the formation of the hazardous decomposition products mentioned in the Reactivity Data section of this MSDS. Do not spray near flames or sources of ignition. Do not pierce or burn container, even after use.

7.2 STORAGE

Store away from heat. Store away from strong bases.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits and/or control mist, vapor, or spray. If ventilation is not adequate, use respiratory protection equipment.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection

As a good industrial hygiene practice:

Avoid eye contact.

The following eye protection(s) are recommended: Safety Glasses with side shields

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8.2.2 Skin Protection

As a good industrial hygiene practice:

Avoid prolonged or repeated skin contact.

Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.

Gloves made from the following material(s) are recommended: Neoprene

Nitrile Rubber

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8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection.

During heating:

Avoid breathing of vapors. Use a positive pressure supplied-air respirator if there is a potential for exposure from an uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection.

Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half facepiece or fullface air-purifying respirator with organic vapor cartridges and P95 particulate prefilters

Half facepiece or fullface supplied-air respirator

Select and use respiratory protection to prevent an inhalation exposure based on the results of an exposure assessment. Consult with your respirator manufacturer for selection of appropriate types of respirators.

8.2.4 Prevention of Swallowing

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

8.3 EXPOSURE GUIDELINES

<u>Ingredient</u>	<u>Authority</u>	<u>Type</u>	<u>Limit</u>	<u>Additional Information</u>
Methyl Nonafluorobutyl Ether	AIHA	TWA	750 ppm	
Carbon Dioxide	ACGIH	TWA	5000 ppm	
Carbon Dioxide	ACGIH	STEL	30000 ppm	
Carbon Dioxide	OSHA	TWA	9000 mg/m3	
Methyl Nonafluoroisobutyl Ether	AIHA	TWA	750 ppm	

SOURCE OF EXPOSURE LIMIT DATA:

ACGIH: American Conference of Governmental Industrial Hygienists
 CMRG: Chemical Manufacturer Recommended Guideline
 OSHA: Occupational Safety and Health Administration
 AIHA: American Industrial Hygiene Association Workplace Environmental Exposure Level (WEEL)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Aerosol
Odor, Color, Grade:	Clear, Colorless, Liquid with Slight Ethereal Odor, Contents Under Pressure
General Physical Form:	Liquid
Autoignition temperature	405 °C [Details: per ASTM E659-84 method]
Flash Point	No flash point
Flammable Limits(LEL)	[Details: None per ASTM 681-94 method @100C]
Flammable Limits(UEL)	[Details: None per ASTM 681-94 method @100C]
Boiling Point	61 °C
Density	1.52 g/ml
Vapor Density	8.6 [Ref Std: AIR=1]
Vapor Pressure	200 mmHg [@ 25 °C] [Details: Internal Pressure for Aerosol Can is approximately 75 psig @25C]
Specific Gravity	1.52 [@ 20 °C] [Ref Std: WATER=1]
pH	<i>Not Applicable</i>
Melting point	<i>Not Applicable</i>
Solubility In Water	< 12 ppm
Evaporation rate	49 [Ref Std: BUOAC=1]
Volatile Organic Compounds	[Details: Exempt]
Kow - Oct/Water partition coef	<i>No Data Available</i>
Percent volatile	100 %
VOC Less H2O & Exempt Solvents	[Details: Exempt]
Viscosity	0.6 centipoise

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.

Materials and Conditions to Avoid:

10.1 Conditions to avoid

Not determined

10.2 Materials to avoid

Strong bases

Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition or By-Products

Substance
 Hydrogen Fluoride

Condition
 At Elevated Temperatures - extreme condition of

Perfluoroisobutylene (PFIB)

heat
At Elevated Temperatures - extreme condition of
heat

Hazardous Decomposition: Decomposition of this product at temperatures above 300 degrees C can form perfluoroisobutylene (PFIB), but PFIB will only accumulate with continuous exposure to excessive heat in a sealed vessel. The formation rate for PFIB is about 1000 times less than the rate for primary thermal decomposition products such as HF. During normal use conditions, no health hazard is associated with the use of this material due to PFIB exposure.

SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

<u>Test Organism</u>	<u>Test Type</u>	<u>Result</u>
Fathead Minnow, Pimephales promelas	96 hours Lethal Concentration 50%	> 7.9 mg/l
Green algae, Selenastrum capricornutum	96 hours Inhibitory Concentration 50%	> 8.9 mg/l
Water flea, Daphnia magna	48 hours Effect Concentration 50%	> 10 mg/l

CHEMICAL FATE INFORMATION

<u>Test Type</u>	<u>Result</u>	<u>Protocol</u>
	See Section 3.3	

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: To reclaim or return, contact your 3M sales representative.

Incinerate in an industrial or commercial facility in the presence of a combustible material. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste. Combustion products will include HF. Facility must be capable of handling halogenated materials.

Facility must be capable of handling aerosol cans. Dispose of empty product containers in a sanitary landfill.

EPA Hazardous Waste Number (RCRA): Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14: TRANSPORT INFORMATION

ID Number(s):

98-0212-3293-3, 98-0212-3329-5, 98-0212-3337-8, 98-0212-3459-0

For Transport Information, please visit <http://3M.com/Transportinfo> or call 1-800-364-3577 or 651-737-6501.

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

Contact 3M for more information.

311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - Yes Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - No

STATE REGULATIONS

Contact 3M for more information.

CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

All applicable chemical ingredients in this material are listed on the European Inventory of Existing Chemical Substances (EINECS), or are exempt polymers whose monomers are listed on EINECS. Contact 3M for more information.

INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification

Health: 3 Flammability: 1 Reactivity: 0 Special Hazards: None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

HMIS Hazard Classification

Health: 0 Flammability: 1 Reactivity: 0 Protection: X - See PPE section.

Hazardous Material Identification System (HMIS®) hazard ratings are designed to inform employees of chemical hazards in the workplace. These ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint and Coatings Association (NPCA).

Revision Changes:

- Section 1: Product name was modified.
- Section 16: Disclaimer (second paragraph) was modified.
- Section 3: Immediate physical hazard(s) was modified.
- Section 5: Unusual fire and explosion hazard information was modified.
- Section 7: Handling information was modified.
- Section 7: Storage information was modified.
- Section 8: Engineering controls information was modified.
- Section 8: Eye/face protection phrase was modified.
- Section 8: Skin protection phrase was modified.
- Section 8: Respiratory protection information was modified.
- Section 8: Prevention of swallowing information was modified.
- Section 13: Waste disposal method information was modified.
- Section 8: Eye/face protection information was modified.

Section 8: Respiratory protection - recommended respirators information was modified.
Section 14: Transportation legal text was modified.
Page Heading: Product name was modified.
Section 15: Inventories information was modified.
Section 9: Vapor pressure value was modified.
Section 9: Boiling point information was modified.
Section 5: Flammable limits (UE) information was modified.
Section 5: Flammable limits (LEL) information was modified.
Section 5: Flash point information was modified.
Section 9: Property description for optional properties was modified.
Section 9: Specific gravity information was modified.
Section 8: Respiratory protection - recommended respirators guide was modified.
Section 9: Flash point information was modified.
Section 9: Flammable limits (LEL) information was modified.
Section 9: Flammable limits (UEL) information was modified.
Section 8: Exposure guidelines ingredient information was modified.
Section 8: Skin protection - recommended gloves information was added.
Section 8: Skin protection - recommended gloves text was added.
Section 8: Skin protection - protective clothing text was added.
Section 8: Skin protection - recommended gloves - punctuation was added.
Section 6: 6.2. Environmental precautions heading was added.
Section 6: 6.1. Personal precautions, protective equipment and emergency procedures heading was added.
Section 10.1 Conditions to avoid heading was added.
Section 10.2 Materials to avoid heading was added.
Section 16: Web address was added.
Section 6: Personal precautions information was added.
Section 6: Environmental procedures information was added.
Section 6: Methods for cleaning up information was added.
Section 10: Materials to avoid physical property was added.
Section 10: Conditions to avoid physical property was added.
Section 1: Address was added.
Copyright was added.
Company logo was added.
Section 6: Clean-up methods heading was added.
Telephone header was added.
Company Telephone was added.
Section 1: Emergency phone information was added.
Section 1: Emergency phone information was deleted.
Section 7: Storage comment was deleted.
Company Logo was deleted.
Copyright was deleted.
Section 16: Web address heading was deleted.
Section 6: Release measures information was deleted.
Section 6: Release measures heading was deleted.
Section 10: Hazardous decomposition or by-products phrase was deleted.
Section 10: Materials and conditions to avoid physical property was deleted.
Section 1: Address line 1 was deleted.
Section 1: Address line 2 was deleted.

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